III. REMARKS

In the Office Action, request was made (Point 2 of the Action) for information in the matter of automatic visual inspection systems for defects, and also for each publication relied upon by applicants in developing the subject matter presented in the original drawing figures 2-4. Request was made also (Point 3 of the Action) for correction of the drawing figures 2, 3 and 4 by replacing the term "semiconductor" with the term "OPC" for conformance with the teaching of the specification.

Claims 1, 4, 6, 8, 9, 11-13, 18, 20, and 24-27 were rejected under 35 U.S.C. 103 as being unpatentable over Herbert (US 5,352,329) in view of Ono (JP 03291552), Brown (US 5,157,463), and Bose (US 5,040,228) for reasons set forth in the Office Action. Claims 2, 3, 5, 21 and 22 were rejected under 35 U.S.C. 103 as were claims 1 and 20 and further in view of Roy (US 6,118,540), Claims 7, 15 and 16 were rejected under 35 U.S.C. 103 as were claims 1 and 20 and further in view of Brown (US 5,118,193), Claim 10 was rejected under 35 U.S.C. 103 as was claim 8 and further in view of Langley (US Pat. Pub. 2001/0012392), claim 14 was rejected under 35 U.S.C. 103 as was claim 11 and further in view of Lindow (US 4,748,335), Claim 17 was rejected under 35 U.S.C. 103 as was claim 11 and further in view of Nakagawa (US 4,148,065), and claims 19 and 23 were rejected under 35 U.S.C. 103 as was claim 11 and further in view of Wasserman (US 5,517,235) for reasons set forth in the Action.

With respect to the examiner's request for information in Point 2 of the Office Action, Applicants' attorneys have consulted with personnel of the assignee, XEROX, of this application, including two of the inventors, Stanley Pietrzykowski and Kamran

Zaman, who were provided with a copy of Point 2 of the Action, and who conducted an investigation including consultation with XEROX personnel and review of the file of the invention disclosure and materials relating to the drafting of this patent application in order to obtain the information requested by the examiner. Subsequent to this investigation, the inventor Kamran Zaman reported to Applicants' attorneys that there was no prior art available to the inventors at the time when they were working on the present invention. Accordingly, in response to the examiner's request for an item of information, the following statement (appearing on page 3 of the Action at lines 15-16) is made, namely, that the item of information is unknown and cannot be readily obtained.

The requirement for correction of the drawing is made by including with this response three replacement sheets of drawing wherein, in Figs. 2, 3 and 4, the term "semiconductor" is replaced with "OPC".

The following argument is presented to overcome the rejections under 35 U.S.C. 103, and to show the presence of allowable subject matter in the claims. The claims have not been amended because the present text of the claims is believed to present allowable subject matter.

With respect to the foregoing rejections under 35 U.S.C. 103 based on the cited art, it is noted that the basic ground of rejection is the combination of the teachings of Herbert with Ono, Brown and Bose. The examiner relies on these four references for many of the claims and, for claims reciting further limitations not taught by these two references, the

examiner combines teachings from these four references with teachings from additional references, as set forth above.

With respect to Herbert, there is a general discussion of defect in photoreceptor coatings, the nature of the defect, the need for correcting such defect, and various ways of correcting the defect including solvents (col. 1 at line 46) and mechanical devices such as brushes and webs (col. 1 at lines 50-54).

The defect has the form of a bead of coating material (col. 1 at lines 33-34) that forms at the bottom end of the drum substrate. Correction of the defect is accomplished by removal of a bead of the coating material (col. 1 at lines 39-40), wherein the method of removal of the excess photoconductive coating material (col. 1 at lines 44-45) is known as bottom edge wipe, a term that appears in claim 1.

The significance of the bead may be appreciated upon a study of the teachings of Ono and Bose. The teaching of Ono relates to the illumination of the surface of material that is capable of propagating radiation upon illuminating the surface with a beam of the radiation oriented at, or in the vicinity, of the Brewster angle (wherein all of the incident energy goes into the refracted wave). Data of the condition of the front surface of the material can be obtained by examination of a beam reflected from the front surface and a beam which traverses through the material to be reflected from a back surface.

In Bose, a lens is stepped incrementally to observe intensity of light received from a pixel on an illuminated surface, wherein the intensity varies with distance of the lens from the surface.

By examination of a histogram of received intensity, a distance of best focus is obtained.

It is clear from the foregoing discussions of Ono and Bose, that their teachings employ optical systems employing a relationship between incident and reflected beams with a reflecting planar surface. The presence of a bump, such as the aforementioned bead of photoconductive coating material, on each of their respective reflecting surfaces would make their reflecting surfaces inoperative for their respective optical systems. Both Ono and Bose demonstrate how difficult it is to provide an optical system that can provide useful information about a defect on the surface of a drum-shaped photoreceptor of an electrostatic copying machine (such as that described by Herbert in col. 1 at lines 11-23) when the defect takes the form of a bead of photoconductive coating material. Both Ono and Bose emphasize the novelty of the present invention, wherein the optics used for examination of the object under test, by the present invention, is not based on a geometrical relationship among incident and reflected beams as taught by Ono and Bose but, rather, is based on observation of intensity of light reflected from an irregularly shaped bead of coating illuminated by light from a lamp.

An attempt to combine Ono and Bose with Herbert would lead one away from the practice of the present invention. An attempt to combine the teachings of Brown with the teachings of Herbert, Ono and Bose would also fail to lead one to the practice of the present invention.

Brown deals with the detection of defects in a coating of solder used to join the leads of electrical components of an electronic

circuit. There is no suggestion in Brown, nor in any of Herbert, Ono and Bose, that there is a similarity between a solder defect on the lead of an electrical component of a circuit and a bead of photoconductive coating material forming a defect on the surface of a drum-shaped photoreceptor of an electrostatographic copying machine. In contrast to the above-noted planar surfaces treated by Ono and Bose, Herbert and Brown deal with non-planar surfaces, namely, a bead of photoconductive coating in Herbert and a blob of solder in Brown. Brown (column 3 at line 63) requires the outputting of statistical data to describe the defect in the solder coating.

It is emphasized that the present claims specifically relate to an OPC device, as is evidenced by claim language reciting (in claim 1) "optically classifying residues on at least one bottom edge area of an organic photo conductor (OPC) device". The coating on the OPC device and a bottom edge wipe defect, such as a bead of the coating, is also disclosed in claim 26 that recites "optically classifying residues on a bottom edge wipe (BEW) region of an organic photo conductor (OPC) device".

As has been noted in the argument of the previous response, it is believed that there are numerous techniques available for the analysis of images, whether the images be obtained by use of sonic radiation or electromagnetic radiation. For purposes of argument, let it be assumed that such techniques and combinations of the techniques are known and have been used for extraction of information from images. The utility of any one technique depends on the nature of the subject matter being imaged, and can be determined only by experimentation. The fact that a specific technique may have been used in one situation (for example, the observation of the color of a pie in an oven

to determine if the pie is edible) does not mean that the technique would be useful in a different situation such as determining whether drippings from the pie are falling on the floor of the oven. In the latter case, a technique of pattern recognition might be required to determine if an image of the oven floor shows signs of drippings.

The foregoing example is provided to demonstrate that knowledge of a technique of measurement and/or analysis for one type of subject does not mean that the technique is useful for a second type of subject unless the nature of the subject matter requires such a technique, and preferably, experimentation has been conducted to determine that the technique is successful. The success of a technique for analysis of one type of subject by examination of the subject's image does not suggest that the technique can be employed successfully for analysis of a second type of subject until a detailed study and preferably experimentation is conducted with the second type of subject.

Brown teaches (col. 1 at lines 40-45) that a grid can be used to count the number of squares in an image of a solder joint to determine whether a sufficient percentage of the region of the joint is covered with the solder. A wire which has been soldered is examined (col. 1 at lines 63-67) by rotation of the wire to view the entire wire surface in several steps. Still, it is understood that a number of available lighting techniques (col. 1 at lines 53-56) make it difficult to identify surface defects on an electrical lead. Therefore, an averaging technique (col. 1 at lines 67-68) is employed by Brown.

The foregoing problems addressed by Brown, when viewed in the light of the aforementioned observations on the requirements for

viewing different types of subject matter, clearly suggest that the methodology of Brown may not be applicable to detection of a bead of photosensitive material on a photoreceptive drum surface. The findings of Brown, whether they be useful or not useful for a photoreceptive coating bead, can be determined only by experimentation. In Brown, the determination of the nature of the defect is made by observing the presence and the absence of solder at various locations on an electrical lead. Since the metallic composition of the electrical lead differs from the metallic composition of the solder, in the presence of illuminating light, the wire and the solder may be distinguishable in the same manner that the squares of a checkerboard are distinguishable.

However, when trying to distinguish a bed of photoreceptive material against a coating of such material, as in the situation dealt with by the present invention, color might not be a sufficient basis of determination of the presence of absence of the bead. Shading of the three-dimensional bead by different glancing angles of incident radiation and their corresponding reflected rays may be a key identifier of the bead, this being similar, possibly, to the identification of an icicle lying on a sheet of ice.

In view of the foregoing analysis, it is urged that the teachings of the cited art cannot be applied to various types of subject matter, particularly the present bead of photosensitive material against a coating of photosensitive material, but is limited to the subject matter being considered by each of the respective references. The present claims clearly identify the subject matter being observed by the system and method of the present invention, so as to enable a distinction to be made from

the teachings of the present invention and the teachings of the cited art.

Also, as noted in the argument of the previous response, Herbert does not give any suggestions or guidelines for a computer-aided vision process, and certainly does not show a computer-aided vision process adapted for analysis of coatings and beads on the coating. Therefore, an attempted combination of the Herbert teaching with the Brown teaching on computer-aided vision (Brown col. 2 at line 50 to col. 4 at line 6) adds no useful information to the Brown teaching with respect to inspection of an OPC device. Therefore, there is no motivation to combine these two references, and also there is no motivation to provide further combination with the teachings of Ono and Bose for the reasons present above. Therefore, it is urged that the examiner cannot combine the teachings of the cited art in an attempt to show that the present claims are obvious over the cited art.

No art cited by the examiner discusses a photographing of an OPC device followed by analysis of the resulting image as a way of gaining knowledge about the adequacy of the coating. Herbert discusses the prior art to identify various ways of handling photoconductive coating layers, and the present specification discusses the prior art with respect to a failure to provide automated visual inspection systems for bottom edge wipe defects.

With respect to the teachings of other ones of the references that have been combined with Brown and Herbert, Roy teaches the use of an optical system to be employed with a computer for examination of circuit packages (Abstract), but there is no teaching of examination of beads on the OPC coating dealt with

by the present invention. Langley teaches apparatus for illuminating and observing semiconductor wafers (Abstract) with processing of a received image, but there is no teaching of examination of beads on the OPC coating dealt with by the present invention. Lindow teaches the transport and optical viewing of semiconductor wafers, and plots reflectivity (col. 9 at lines 57-60), but there is no teaching of examination of beads on the OPC coating dealt with by the present invention. Nakagawa teaches the optical viewing of masks with photodiode arrays (col. 5 at lines 25-37) and observing different levels of video signals (col. 5 at lines 60-62), but there is no teaching of examination of beads on the OPC coating dealt with by the present invention. Brown '193 discusses illumination of a surface (Abstract) to determine if there are voids, this providing the same problem of observation of a three-dimensional object as described above with respect to the soldered leads of Brown '463; therefore the good results mentioned by the examiner with reference to Fig. 4 of Brown '193 could not be obtained in the environment of the present invention. Wasserman deals with observation of defects in a printed circuit board and, therefore, the comments made above with respect to the soldered leads of Brown '463 apply to Wasserman.

Accordingly, it appears that the examiner has provided evidence of the existence of various techniques of measurement and analysis used in imaging devices, but has provided no teaching stating what type of technique(s) would be useful to analyze an OPC coating to determine whether it is necessary to implement a bottom edge wipe for proper manufacture of an OPC device. Particularly with respect to the present method claims, the existence of known devices and techniques gives no indication as to how a novel method is to be performed, even if one or more of

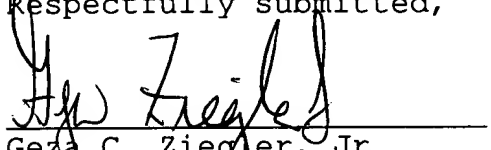
the known techniques is to be employed in the method. The present invention deals with a situation in which a coating is applied to an element used in photo-optical equipment, wherein there may be dripping of the coating. This is a different situation from any of those presented by the examiner and, therefore, there is no teaching in the art presented by the examiner which suggests how one is to analyze the coating.

It is believed that the foregoing argument has overcome the rejections under 35 U.S.C. 103 raised in the present Office Action, and that patentable subject matter is present in the claims.

For all of the foregoing reasons, it is respectfully submitted that all of the claims now present in the application are clearly novel and patentable over the prior art of record, and are in proper form for allowance. Accordingly, favorable reconsideration and allowance is respectfully requested. Should any unresolved issues remain, the Examiner is invited to call Applicants' attorney at the telephone number indicated below.

The Commissioner is hereby authorized to charge payment for any fees associated with this communication or credit any over payment to Deposit Account No. 24-0037.

Respectfully submitted,



1 April 2005

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